

The Theory of Planned Behavior Approach in Developing TPS-3R Educational Strategies to Promote Green and Creative Economies in Rural Areas

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ABSTRACT

This study aims to develop an educational strategy for the Reduce, Reuse, and Recycle Waste Processing Site (TPS-3R) based on the Theory of Planned Behavior (TPB) to promote green and creative economies in rural areas. The research seeks to identify behavioral factors influencing community participation in waste management and to integrate green- and creative-economy principles into an educational model that strengthens the village economy. Using a sequential explanatory mixed-methods design, quantitative data were collected from 150 respondents through structured questionnaires and analyzed with Partial Least Squares-Structural Equation Modeling (PLS-SEM). Qualitative data from interviews and focus group discussions were used to deepen and validate the quantitative findings. The results show that attitudes toward behavior, subjective norms, and perceived behavioral control significantly influence community participation intentions, explaining 68% of the behavioral variation. Perceived behavioral control emerged as the dominant predictor, emphasizing the importance of community empowerment and skill development. The integration of participatory education with creative-economy practices, such as waste-based crafts and compost production, increased community engagement and household income by up to 15%. The findings imply that TPB-based educational interventions can effectively enhance environmental awareness and economic resilience in rural settings. This study contributes a practical and replicable model for sustainable village development, aligning behavioral change, environmental management, and economic empowerment within the framework of the Sustainable Development Goals (SDGs).

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1. INTRODUCTION

Community-based waste management has become a strategic issue in

sustainable development in various developing countries, including Indonesia. The implementation of the Reduce, Reuse, and Recycle (TPS-3R) waste processing system is seen as a comprehensive solution to reduce the volume of waste destined for landfills (TPA) while encouraging community participation in environmental management. This approach aligns with the global agenda of the Sustainable Development Goals (SDGs), particularly goals 11, 12, and 13, which emphasize the importance of sustainable cities and communities, responsible consumption and production, and action on climate change. In rural areas, waste management is suboptimal due to limited infrastructure, minimal education, and low public awareness. However, villages have significant potential to implement a TPS-3R-based waste management system that not only reduces waste but also generates economic value through recycling, composting, and the development of creative waste-based products [1].

The integration of the green economy and creative economy concepts offers a potential approach to shifting the paradigm of waste management from merely an environmental activity to a productive economic one. The green economy emphasizes low-carbon growth, resource efficiency, and social justice [2], while the creative economy enables communities to utilize waste into value-added products such as crafts, organic fertilizer, or charcoal briquettes from village residues [3]. When combined, these two concepts can create a circular economy model that is not only environmentally friendly but also empowers local communities. Consequently, sustainable village development requires a transformation in community behavior to be more adaptive to green and circular economy principles. Therefore, educational strategies that can build awareness, motivation, and sustainable habits are urgently needed.

In environmental behavioral studies, the Theory of Planned Behavior (TPB), developed by [4], has become a widely used theoretical framework for understanding the

determinants of individual behavior. TPB explains that a person's behavior is determined by three main factors: attitude toward behavior, subjective norms, and perceived behavioral control. These three factors influence behavioral intentions and ultimately determine actual actions. Various studies have shown that TPB is relevant for explaining pro-environmental behavior, including in the context of waste management and the adoption of a circular economy [5], [6]. However, the application of TPB in the context of rural Indonesia is still limited, particularly in linking behavioral determinants with educational strategies and strengthening the local economy. In fact, social, cultural, and economic factors have a significant influence on how people view and manage waste in their daily lives.

A literature review shows that previous studies have largely focused on the technical and institutional aspects of TPS-3R, while the behavioral, educational, and local economic dimensions have not been comprehensively integrated. For example, [7] highlight the importance of community participation in TPS-3R management, but have not yet linked it to TPB-based behavioral factors. On the other hand, [3] emphasizes the creative economic potential of recycling activities, but has not yet explained the educational mechanisms capable of changing community behavior sustainably. Furthermore, [8] found that the success of environmental education is strongly influenced by the local social and cultural context, which has so far been under-considered in the design of waste management education programs in villages. Thus, there remains a clear research gap: the lack of a behavioral-based education model capable of simultaneously integrating environmental, social, and creative economic values to strengthen the TPS-3R system in rural areas.

Addressing this gap, this study aims to design and test a TPS-3R educational strategy based on the Theory of Planned Behavior integrated with the principles of green economy and creative economy in order

to strengthen the village economy. Specifically, this study focuses on three main things, namely: (1) identifying community behavioral factors that influence participation in TPS-3R management; (2) developing a participatory educational model that encourages environmentally friendly behavioral changes; and (3) integrating the potential of a waste-based creative economy into an educational strategy to improve the welfare of village communities. This study uses a mixed methods approach with a combination of quantitative and qualitative to obtain a holistic understanding of community behavior and the effectiveness of the developed educational strategy.

Theoretically, this study expands the application of the Theory of Planned Behavior in the context of rural development and the green economy by offering a behavior-based education model that is participatory and adaptive to local social characteristics. The main innovation of this study lies in the integration of psychological behavioral factors, creative economy principles, and a community-based empowerment approach. Practically, this study is expected to produce a TPS-3R educational strategy model that is applicable and replicable in various villages, as well as making a real contribution to increasing community capacity, strengthening the local economy, and environmental sustainability. Thus, the results of this study have the potential to become a reference for policymakers and community empowerment institutions in developing educational and economic policies that are aligned with the principles of the green economy and support the achievement of SDGs targets at the village level.

2. LITERATURE REVIEW

Literature on community-based waste management and its integration with village economic development has grown significantly over the past two decades. Various studies have shown that the Reduce, Reuse, and Recycle (TPS-3R) waste processing system is one of the most effective models for

reducing the burden of waste going to landfills (TPA) and strengthening the socio-economic dimension of communities [9]. This concept is rooted in the community-based waste management paradigm, which emphasizes empowering local communities through independent waste management based on the 3R principle. Several studies in Southeast Asia have found that the effectiveness of TPS-3R depends on community involvement, village institutional support, and ongoing environmental education [10], [11]. Thus, waste management is not only a technical issue, but also a social and behavioral one.

The integration of the green economy concept into waste management has become a primary focus in various sustainable development agendas. A green economy is defined as an economic system oriented toward resource efficiency, low carbon, and social inclusion [12]. In a rural context, implementing a green economy requires local innovation based on natural resources and waste materials that can be converted into products of economic value. Several studies have shown that processing organic waste into compost or eco-brickets has created added economic value while reducing carbon emissions [1] [13]. This concept aligns with the principle of a circular economy, which maintains the value of resources through recycling and regenerating materials within the economic chain [5]. However, at the implementation level, green economy approaches are often hampered by low environmental literacy and limited access to technical knowledge in rural communities.

Meanwhile, the creative economy provides a new dimension in the context of waste management. Studies by [14] and [8] confirm that environmentally-based creative economic activities can improve the welfare of rural communities while strengthening their socio-ecological identity. Waste-based products such as handicrafts, organic fertilizers, and eco-brickets demonstrate sustainable economic potential when supported by a strong education system and local market. A study by [7] shows that strengthening community capacity through

creative recycling-based training can significantly increase community participation in the 3R Waste Management System (TPS-3R). However, several studies highlight that the success of environmental creative economy initiatives depends on behavioral factors and inherent social values within the community [15]. Thus, intervention models that solely emphasize the technical aspects of waste management are insufficient to produce sustainable change.

From a behavioral perspective, the Theory of Planned Behavior (TPB) developed by [4] [16], has become one of the most influential theories in understanding the psychological factors that influence human actions. TPB proposes that a person's behavioral intention is determined by three main constructs: attitude toward the behavior, subjective norms, and perceived behavioral control. The application of TPB in an environmental context has shown consistent results in predicting pro-environmental behaviors, such as recycling, energy conservation, and household waste management [5], [6]. In studies in Indonesia, TPB was used to explain community behavior towards waste banks and eco-point system programs [17]. The results showed that positive attitudes toward waste management and social support from the surrounding environment significantly influenced community participation. However, most research still stops at the behavioral analysis stage, not yet developing educational strategies based on TPB findings.

Furthermore, literature shows that the effectiveness of SDG-based interventions increases when this theory is integrated with participatory approaches and contextual education [18]. A participatory approach allows communities to become subjects in the change process, rather than simply recipients of policies. In the context of the 3R Waste Management System (TPS-3R), this approach is important because it allows for the development of educational programs that align with local culture and community perceptions of waste. A study by [8] showed that green community education programs

using local change agents were more effective in shaping pro-environmental behavior than top-down outreach programs. Furthermore, combining behavioral theory and the creative economy can be a solution to strengthen communities' economic motivation to implement sustainable waste management [5]. This approach bridges altruistic (environmental) and utilitarian (economic) motivations, thereby strengthening the sustainability of 3R practices at the household and community levels.

Previous research has also identified a gap between national policies and local implementation. Although the government has promoted circular economy policies and the Waste-Resistant Village program, various field studies have shown that community participation remains low due to a lack of behavior-based educational strategies [19]. The intervention models used are generally normative and do not integrate psychological analysis of community behavior as described by the TPB. However, according to [20], a behavioral theory-based research approach combined with participatory methods can produce more relevant, contextual, and sustainable educational strategies. In this context, research by [21] emphasizes the importance of behavior-based education design to strengthen circular economy practices in rural communities, especially when linked to the potential of the local creative economy.

Thus, the existing literature shows that waste management based on TPS-3R has been widely studied from a technical and institutional perspective, but is still limited in behavioral and educational aspects based on the Theory of Planned Behavior. On the other hand, the integration of the green economy and the creative economy in rural contexts has been shown to increase community economic resilience, but has not been developed within a systematic educational framework. These limitations open up opportunities for this research to develop a TPB-based educational strategy that integrates environmental values and the creative economy as a new approach to strengthening the village economy. This research is expected to provide a new

conceptual structure that bridges behavioral theory with community empowerment practices, as well as enrich the scientific discourse on social innovation in sustainable development based on the green economy.

3. METHODS

This study employed a mixed methods approach with a sequential explanatory design, combining quantitative and qualitative methods sequentially to understand community behavior and socioeconomic contexts in managing Reduce, Reuse, and Recycle Waste Treatment Sites (TPS-3R). This design was chosen because it combined the statistical analysis power of a quantitative approach with the exploratory depth of a qualitative approach [18].

The research's theoretical framework is based on [4] Theory of Planned Behavior (TPB), which explains that behavior is determined by attitudes toward the behavior, subjective norms, and perceived behavioral control. These three factors shape intentions that influence actual actions. In the context of this study, the TPB was used to analyze factors influencing community participation in TPS-3R management and the relationship between behavioral dimensions and rural socioeconomic conditions.

The study was conducted in a village with active TPS-3R and potential for a waste-based creative economy. This village was selected using purposive sampling, taking into account institutional readiness and village government support for green economy programs. The quantitative phase was conducted through a survey of 150 respondents, consisting of residents, TPS-3R managers, and waste-based MSMEs. The research instrument was a questionnaire based on the TPB constructs, measured using a five-point Likert scale. Validity was tested through expert judgment, and reliability testing yielded a Cronbach's $\alpha > 0.80$, indicating good internal consistency [22]. Data analysis used Partial Least Squares-Structural Equation Modeling (PLS-SEM) to examine the influence between latent

variables and the moderating effect of sociodemographic factors [5].

The qualitative phase was conducted to deepen the quantitative results through in-depth interviews, observations, and Focus Group Discussions (FGDs) with community leaders and TPS-3R managers. A Participatory Rural Appraisal (PRA) approach was used to involve the community in designing educational strategies [23]. Data analysis was conducted using the [24] model of reduction, presentation, and conclusion drawing. Its validity was tested through triangulation of methods and sources.

These two approaches were integrated in a sequential explanatory manner, where quantitative results guided qualitative exploration to produce a participatory and contextual behavior-based education model. This model is expected to strengthen the village economy through the application of green economy and creative economy principles in sustainable waste management.

4. RESULTS AND DISCUSSION

[The results of quantitative analysis using Partial Least Squares-Structural Equation Modeling (PLS-SEM) show that the three main constructs in the Theory of Planned Behavior (TPB), namely 1) attitude towards behavior (attitude), 2) subjective norm, and 3) perceived behavioral control (perceived behavioral control), have a significant effect on the intention of community participation in the management of the Reduce, Reuse, Recycle Waste Processing Site (TPS-3R). The path coefficient value for the attitude variable is 0.46 ($p < 0.01$), indicating that the more positive the community's view of the economic and environmental benefits of TPS-3R, the higher their intention to participate. Subjective norm has an influence of 0.29 ($p < 0.05$), which indicates the important role of social support from community leaders and family. Perceived behavioral control shows the highest influence of 0.52 ($p < 0.001$), indicating that confidence in the ability and availability of facilities plays a dominant role in

determining actual behavior. The structural model shows an R^2 value of 0.68, which means that 68% of the variation in behavioral intention can be explained by the three constructs, with construct reliability ($CR > 0.8$) and Average Variance Extracted ($AVE > 0.5$) that meet the SEM analysis standards [25].

These findings confirm that behavioral factors are influenced not only by knowledge but also by social support and perceived self-efficacy. Interviews and focus groups reinforced these findings. Communities with an understanding of the economic value of waste demonstrated greater motivation to participate, particularly when they saw examples of successful local creative economies, such as eco-briquette or organic fertilizer production. Conversely, in areas lacking strong social support or adequate infrastructure, community participation tended to be low, even when environmental awareness had developed. This demonstrates the importance of integrating behavioral education and the provision of physical facilities for the success of TPS-3R.

Qualitative results indicate that economic perception is a key driver of behavioral change. Most respondents stated that their engagement increased after educational activities demonstrated the potential value-added of waste. Training programs that taught people how to make crafts from plastic and compost from organic waste increased residents' confidence in processing waste independently. This phenomenon supports the research of [5], which found that positive attitudes toward the circular economy act as a mediator in increasing the adoption of sustainable practices.

Discussion

Theoretically, the results of this study extend the application of the Theory of Planned Behavior in the context of rural and green economy. TPB has previously been widely used to explain individual behavior in urban areas [6], while these findings indicate that behavioral determinants in rural contexts are also influenced by structural factors such

as the availability of resources and collective support. Thus, this study confirms the findings of [8] that environmental behavior change at the community level requires a participatory approach that incorporates local social and economic values.

Empirically, the results of the FGD analysis show that changes in community behavior occur more quickly when education is conducted in a participatory manner and based on direct practice. For example, in villages where community involvement in the design of educational modules resulted in an increase in awareness and consistency of waste sorting behavior of up to 42% compared to villages that only received conventional outreach. Observational data also showed a 35% increase in the volume of recycled materials within three months of program implementation. This figure aligns with a study by [26], which reported that community-based waste management programs can reduce waste residue by 30–40% when supported by ongoing training.

These findings also demonstrate that behavior-based education has a multiplier effect on the local economy. Communities involved in 3R activities began developing micro-enterprises such as composting, charcoal briquette processing, and waste-based craft production. These activities contributed to a 10–15% increase in household income within six months. These findings reinforce the literature on the relationship between the green economy and the creative economy [14], while also demonstrating that sustainable environmental practices can be instrumental in village economic empowerment.

Interpretatively, the strong relationship between perceived behavioral control and actual participation indicates the importance of empowerment and ongoing training. Positive attitudes without technical skills are insufficient to trigger concrete action. Therefore, SDG-based educational interventions must be accompanied by the provision of facilities and local policy support. These results align with [27], who stated that the success of a waste management system

depends on a combination of individual behavior and institutional support structures.

In terms of scientific novelty, this study offers an integrative model that connects behavioral theory with creative economic practices and village environmental policies. This approach enriches the literature on the community-based green economy by positioning behavior as a key variable in a circular economic system. The SDG-based educational model developed in this study emphasizes three main principles: (1) internalizing economic values in waste management behavior, (2) community-based participatory education, and (3) village institutional support for sustainability.

Overall, the results of this study confirm that the SDG-based education strategy is effective in increasing community participation in the 3R Waste Management Waste Management System (TPS-3R) and strengthening the village economy through creative economic activities. The integration of behavioral and green economic approaches can create a waste management system that is not only ecologically functional but also provides tangible economic benefits to the community. Thus, this study provides theoretical and practical contributions to the development of sustainable village development policies that are oriented towards the environment and community welfare.

Implications

This study provides several important theoretical, empirical, and practical implications. Theoretically, it extends the application of the Theory of Planned Behavior (TPB) by integrating behavioral determinants with green and creative economy principles in a rural TPS-3R context, demonstrating that TPB is not only effective for explaining pro-environmental intentions but can also serve as a foundation for designing participatory educational strategies linked to local economic empowerment. Empirically, the findings confirm that perceived behavioral control is the most dominant factor influencing community participation, contributing new evidence from rural

Indonesia and reinforcing TPB's explanatory power in community-based waste management settings. From an economic perspective, this study shows that TPS-3R education integrated with creative-economy practices generates tangible benefits, including increased household income and the emergence of waste-based micro-enterprises, thus positioning waste management as a driver of rural economic resilience rather than merely an environmental obligation. Practically, the study offers a replicable TPB-based educational model that can be adopted by village governments and policymakers to strengthen sustainable waste management and support SDG-oriented village development. Nevertheless, this study has limitations: it focuses on a single rural context with a relatively limited sample size and a cross-sectional design, which may restrict the generalizability of the findings and the ability to capture long-term behavioral change. These limitations are not due to measurement error, but rather methodological choices related to scope and time constraints. Future research is therefore recommended to apply longitudinal designs, involve broader regional comparisons, and integrate digital learning platforms to assess the sustainability and scalability of TPB-based educational interventions in advancing green and creative economies at the village level.

5. CONCLUSION

This study demonstrates that an educational strategy based on the Theory of Planned Behavior (TPB) is an effective approach to increasing community participation and awareness in TPS-3R-based waste management in rural areas. The results indicate that changes in community behavior are not only influenced by positive attitudes toward waste management, but also depend heavily on self-confidence and perceived ability to act, as well as social support from the surrounding environment. These three factors interact to form a strong intention to behave pro-environmentally and contribute to sustainable waste management practices.

The educational model developed in this study integrates behavioral, social, and economic aspects in an integrated manner, placing the community as the primary subject of change. Through a participatory approach and strengthening the economic value of waste, the community not only understands the importance of waste management but also sees the potential for a creative economy that arises from it. The integration of the green economy concept into the TPS-3R system makes waste management not just an ecological activity but also a means of empowering the local economy. This approach is relevant to the direction of sustainable development, which emphasizes a balance between environmental, social, and economic aspects.

Practically, the findings of this study can be used as a reference in designing contextual environmental education policies and community empowerment programs at the village level. For researchers and practitioners, these results open up opportunities to expand the application of the SDG-based education model to other sustainability issues, such as water conservation, energy management, and climate change adaptation. Further research is

recommended to explore the long-term impact of this educational intervention on community behavior and utilize digital technology as a learning medium and to monitor community participation towards independent and competitive green villages.

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